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Automatic Door or Window System

The invention concerns an automatic door or window system with the features of the preamble of claim 1.

An automatic door or window system such as this is known from German patent publication DE 298 19 342. It is an automatic sliding door system. The drive motor, the electric control, and other electric components such as the locking and control sensors in this known system are mounted on the fixedly mounted slide track of the sliding wing. The electric components are electrically connected with each other via a cable connection. When producing and assembling the drive, this has as a consequence a relatively high effort for producing the electric connection. The cable connection also requires a large construction space.

In other differently built known automatic door systems such as, for example, those described in European patent publication EP 0 597 208 A1, a sliding wing system driven by an electric motor is known. The sliding wings are guided partition wall elements that can be displaced in a slide track via a reel car. The drive motors are mounted on the reel car. The outgoing shaft of the drive motor is operationally coupled to a shaft of the cam roller via a belt drive and a planetary drive. The power supply of the wing-fixed drive motors takes place via current

collectors that measured up a bus bar arranged on the ceiling in the interior of the slide track profile. Aside from the drive motors, no other electric components are provided on or in the movable wing in this arrangement so that the bus bar serves merely for the transmission of energy to the drive motors.

From the international patent publication WO 99/04 122 is known another automatic sliding door system. On the wings and on the slide track are arranged electric components. Especially the drive motor is fixedly arranged on the wing or the reel car and the control unit is fixedly arranged on the slide track. A bus bar is provided for supplying the power and signal transmission from the fixed electric control to the movable drive motor. The current collection of the motor takes place via collecting contacts or via the cam rollers of the reel car. In each case, the bus bar is arranged in the slide track so that the connection of other electric components to the bus bar can only be realized with difficulty. The supplementary connection of other electric components is not provided.

The object of the invention is to provide an automatic door or window system which is more simply built and more universally utilizable.

This object is attained, according to the invention, via the object of claim 1.

The automatic door or window system can be arranged on a fixed mountable carrier. It has a slide track for a displaceable guided wing, preferably a sliding wing or folding wing. On the slide track are arranged a fixedly mountable electric drive unit as well as other fixedly mountable electric functional units such as, for example, power supply units and/or locking devices and/or emergency power supply units.

A bus arrangement is provided for the transmission data and/or signal transmission. The data and/or signal transmission can take place between the electric functional units themselves or also between the electric functional units and the electric drive unit. The electric functional units can also be rearranged and/or removed later and/or additional electric functional units can be attached to the bus unit. Supplementary expansions or repairs can be carried out with ease. The drive unit and/or at least one functional unit can have its own intelligence, preferably a microprocessor. The possibility for the bus unit to have different bus protocols for data and/or signal transmission is created via the intelligent components. The functional units can be configured, for example, as a power supply unit and/or an emergency power unit and/or a locking device and/or a sensor device. The drive unit can have the following components: an electric drive motor and/or a control unit, preferably with a microprocessor, for controlling the drive motor and/or a monitoring device for monitoring the function of the control unit and/or the drive unit and/or the bus arrangement. Aside from the data and/or signal transmission, the power supply can also take place via the bus arrangement.

In a particularly advantageous embodiment, the drive unit, preferably the control unit with microprocessor, is configured to automatically recognize and/or address and/or initialize and/or program the connected functional units. When connecting a new functional unit to the bus arrangement, the drive unit can automatically recognize and/or program and/or set the parameters of the new functional unit. The functional unit can have a response unit, which can be configured with or without its own intelligence and which can coact with the drive unit via the bus arrangement. The drive unit can also be configured so that the already existing functional units can be reprogrammed and/or newly initialized in accordance with the new functional unit. The installation

effort is reduced considerably since with a modification or expansion of the automatic door or window system the adaptation of the functional units and/or the drive units can largely take place automatically. Of course, there is the possibility of conventional manual undertaking or inputting other adaptations and/or programs and/or parameters via a service terminal connected to a bus arrangement.

The bus arrangement advantageously extends over a large part of the width of the slide track. The bus arrangement can also extend in axial direction over the entire width of the slide track. In this way, it is possible to arrange the electric functional units and/or drive units in any desired axial position in the housing.

The bus arrangement can have a ribbon cable with rectangular cross section and parallel conductors for data and/or signal transmission. In this way, the individual conductors of the ribbon cable can be configured as bus lines. A groove, which is configured as a carrier for the bus arrangement on the profile housing, is advantageously provided. The ribbon cable can be held in the groove, or either one or several parallel conductors can be arranged isolated from each other.

The connection of the electric function units to the bus arrangement takes place advantageously in a cutting/clamping technique. For this purpose, the electric functional units can have a clamping arrangement. The clamping arrangement can be configured so as to be suspended and/or screwed and/or clipped and has more or less electrically conducting contacting domes, in correspondence to the number and arrangement of the conductors of the bus arrangement. The contacting domes are configured so that, when the clamping arrangement is attached, they cut through the isolation at the bus arrangement and come into electric contact with a conductor of the bus arrangement.

The isolation is advantageously made of an elastic rubber-like material so that, after the removal of one electric functional unit, the remaining contact holes are again closed off by the elastic isolation.

In another embodiment, the electric connection to the bus arrangement can also take place with loop contacts. The conductors then have no or one displaceable isolating cover to make possible the direct electric contact between the loop contacts and the conductors.

In a particularly advantageous embodiment, the arrangement of the conductors and the complementary arrangement of the contacts to the clamping arrangement can be configured so as to be asymmetrical to exclude a false or polarity-reversed electric connection. It can also be provided to configure the clamping arrangement so as to be asymmetrical, for example, to a pin which engages into a groove of the bus arrangement which is configured on one side of the clamping arrangement.

The bus arrangement can also have a mechanical attachment fixture, for example, a releasable clip connection and/or screw connection for mechanically fixing the electric functional units. The clamping arrangement configured for the electric connection is advantageously also a mechanical attachment fitting for the simultaneous mechanical fixing in that, for example, the clamping arrangement has a releasable clip connection and/or screw connection coacting with the bus arrangement.

The bus arrangement can be configured as a two-wire bus or multi-wire bus. In the configuration as a three-wire or multiwire bus, the power supply and the data and signal transmission take place via different electric lines. Suitable bus systems are, for example, a CAN bus or ASI bus. In the advantageous configuration such as a two-wire bus, the power supply and the data and signal transmission take place via the same lines. Suitable bus

systems are, for example, a CE bus or a LON powerline. It can also be conceived to configure the housing of the drive or the slide track to be electrically conducting, for example, as a mass line of the bus arrangement. The housing can then have a part of the bus arrangement, especially a bus line and/or a screening. In the two-wire bus, aside from the housing, only one more conductor must then be provided.

Several sliding door drives can also be coupled, preferably electrically connected via the bus arrangement.

The data and signal transmission to the bus arrangement can be configured coded. In this way, a high interference immunity is obtained with respect to the conventional wiring. Via the use of corresponding error-redundant codes, the interference immunity can be further increased.

The electric functional units can be configured with or without their own intelligence, for example, a microprocessor. In a preferred embodiment, each electric functional unit has its own intelligence. The electric functional units, to increase the operational safety, preferably have their own monitoring unit so as to, for example, detect and report functional malfunctions and/or system disturbances.

The electric drive unit has a drive motor and a control and/or regulation device that coacts with the motor. The drive unit is preferably configured as a bus master. The drive unit can control the data and signal transmission, as well as also carry out safety and initialization functions. In this way, the electric drive unit can be configured for automatically recognizing and/or addressing and/or setting the parameters of the electric functional units, which are connected to the bus arrangement.

An electric functional unit can be configured as a redundant safety device. The safety device is configured for the monitoring of the control and/or regulation devices and can take over the function of the control and/or regulation devices when these fail. In this way, the function of the automatic door or window system is ensured, especially an emergency opening of escape or emergency exit doors also when the control and/or regulation device have failed.

Via an electric functional unit configured as a gateway, the bus arrangement can be connected to a guiding system, preferably a building control system.

Via an electric functional unit configured as an intelligent terminal field, conventionally wired components such as, for example, a key switch and/or emergency unlocking switch and/or control switch can be connected to the bus arrangement. An embodiment of the intelligent terminal field can also be conceivable, which is arranged outside of the profile housing, for example, behind an assigned switching element in a box mounted underneath.

An electric functional unit can be configured as a sensor device, preferably with a motion detector and/or photoelectric sensor and/or photoelectric barrier. In a preferred embodiment, the sensor device is configured so as to be programmable and/or adjustable via the bus arrangement. The sensitivity and/or the directional characteristic can be especially configured so as to be programmable and/or adjustable.

Furthermore, an operating arrangement can be provided, which is connected to the bus arrangement. The operating arrangement can have an input element, preferably a controller, and a display element, preferably a display. The operating arrangement can be configured for setting the mode of operation, and/or for setting the door

parameters, and/or for displaying and storing status messages and/or service data. The operating arrangement can also be configured for programming the electric functional units, for example, a sensor device.

An electric functional arrangement is configured as a power supply unit for supplying electric energy to the functional units. The power supply unit feeds the electric energy needed by the electric functional units into the bus arrangement and generates preferably its own status and/or error messages.

An electric functional unit is configured as a locking device for locking the wing and has an electromechanic locking element. The locking device preferably generates its own error and/or acknowledgement messages.

An electric functional unit is configured as an emergency power supply unit for supplying electric energy to the electric functional units when there is a system failure and has an electric energy storage, preferably an accumulator. The emergency power supply unit preferably generates its own status and/or error messages.

The automatic door or window system has different electric functional units, which can be optionally selected and combined. Their arrangement and electric connection takes place in a simple manner by attaching the electric functional units to the bus arrangement.

The invention will now be explained in more detail with reference to the drawings, wherein:

Figure 1 shows a front view of an automatic door or window system with two driven sliding wing wings,

Figure 2 shows a front view of the automatic door or window system with the cover hood removed,

Figure 3 shows a section along line A-A in Figure 1, and

Figure 4 shows a detail representation in the area of the bus arrangement in Figure 3.

The automatic door or window system shown in Figure 1 has a sliding door drive 2 and two sliding wings 1, which are displaceably guided in an upper horizontal slide track into the sliding door drive 2. On both sides of the door opening is fixedly arranged a fixed field wing 1a. Fanlight wings 1b are arranged over the wings 1a, 1, and over the door guide. All the wings are configured as glass wings, which have a light metal frame, or also as frameless wings. The automatic door or window system is arranged on a pillar-bar construction. The sliding door drive 2 is supported on a horizontal bar above the displaceable sliding wing 1, it is supported via a vertical pillar. The fixed field wings 1a are also attached to different vertical pillars.

In Figure 2, the automatic door or window system with sliding door drive 2 and two driven sliding wings 1 is shown. The two sliding wings 1 are, as described in Figure 1, displaceably guided in an upper horizontal slide track into the sliding door drive. On both sides of the sliding wing 1 a fixed field wing 1a is arranged. The automatic door or window system is arranged in the interior of a building on a wall opening. The sliding door drive is supported by the horizontal carrier or directly by the wall above the displaceable sliding wing 1.

To clarify the arrangement of the components, the sliding door drive 2 in Figure 2 is shown without the cover hood. The housing 7 of the sliding door drive 2 has a bus arrangement 4, which extends in the horizontal direction over the entire length of the housing 7. Parallel to the bus arrangement 4, a mechanical attachment fixture 6 is arranged in the housing 7. The attachment fixture 6 has

an attachment groove which runs parallel above and below the bus arrangement 4. The attachment fixture 6 is configured for holding electric functional components. The electric functional components can be releasably fixed to the attachment grooves via suitable attachment means, for example, screws and/or clamps and/or clips.

On the building wall, in the area of the sliding door drive 2, is arranged an operating arrangement 36. The operating arrangement 36 is connected via a cable 4a to a bus arrangement 4. The operating arrangement 36 can be arranged above in its own housing or below, for example, in a low box. The lines of the bus arrangement 4 is guide directly over the cable 4a to the external operating arrangement 36 and the operating arrangement 36 is configured on the bus arrangement for direct connection.

The operating arrangement 36 has input and display elements, for example, a controller or display, and is configured for adjusting and/or programming electric functional units and/or for displaying status messages and/or operational conditions.

In a modified embodiment, according to Figure 2, however, the connection of the operating arrangement 36 to the bus arrangement 4 can be provided via an electric functional unit carried out as an intelligent terminal field. The intelligent terminal field is connected, on the one hand, to the bus arrangement 4 and has, on the other hand, several electric inputs and outputs for connecting the conventional electric components such as, for example, switches, sensors, and LEDs. The intelligent terminal field is configured so as to be connected to the bus arrangement 4 by electric components without their own intelligence. The intelligent terminal field in the housing 7 can be arranged as an electric functional unit on the bus arrangement 4, or can be arranged under the housing 7, for example, in a box to be mounted below.

On the bus arrangement 4 is arranged the drive unit 31 as well as other electric functional units. The electric functional units can be arranged on the bus arrangement 4 in an optionally axial position. The drive unit 31 has, aside from the drive motor, an intelligent electric control unit with a microprocessor, which is configured as a bus master. The bus master controls the data communication of the bus arrangement 4. The electric control unit can be configured for automatically recognizing and/or addressing and/or initializing electric functional units. After installing an electric functional unit, the same is automatically recognized and/or initialized and/or addressed by the electric control unit. Also a failure or removal of an electric functional unit is automatically recognized by the electric control unit and a corresponding status message is generated and/or a corresponding preselectable action, for example, an emergency opening, is initiated.

In Figure 2, a power supply unit 35 and an emergency power supply unit 34 are arranged as electric functional unit on the bus arrangement 4. The power supply unit 35 feeds into the electric energy for the functional units in the bus arrangement. In the case of an error, for example, a system failure, overheating, or overload, the power supply unit 35 generates corresponding status messages and feeds these also into the bus arrangement 4. The emergency power supply unit 34 has an accumulator which feeds, in the case of a system failure, the electric energy for the functional units into the bus arrangement 4. The emergency power supply unit 34 can be configured so that, because of the system failure generated by the power supply unit 35, it automatically takes over the electric energy supply. In another embodiment, the control unit of the drive unit can be configured for controlling the emergency power supply unit 34.

Furthermore, in Figure 2, a locking device 33 is arranged

on the bus arrangement 4. The locking device 33 has an electromechanic locking element for locking the sliding wing 1. The locking device 33 also has the locking activation and a locking monitoring. The control unit of the drive unit is configured for controlling the locking device 33. The locking device is configured so as to react to the commands locking and unlocking in that the locking device is locked or unlocked and a corresponding acknowledgment message is generated. In the case of an error, for example, the lock is jammed, the locking device 33 transmits the corresponding error message.

In Figure 2, a sensor device 32 is arranged on the bus arrangement 4. The sensor device 32 has one or several sensor(s) such as, for example, motion detectors, photoelectric barriers, photoelectric sensors. The sensor device is configured for the monitoring of the function of the connected sensors and/or for activating the control unit of the drive unit. In another embodiment, also several sensor devices can be connected to the bus arrangement.

The gateway is provided as further functional unit, which is not shown in Figure 2, and which is configured for connecting the bus arrangement 4 to an ancillary guiding equipment, for example, to a building control system.

In Figure 3, a horizontal section is shown along line A-A of Figure 1. The housing 7 of the sliding door drive 2 has a fixed mounted carrier element 71, a slide track profile 72 attached thereto, and a cover hood 77, wherein the axial length of the carrier element 71 and the slide track profile 72 as well as that of the cover hood is identical. The housing extends in horizontal direction above the wing 1, 1a and is supported by the carrier element 71 arranged between the slide track profile 72 and a structural carrier 9, preferably a carrier profile 71 supported by the structural horizontal carrier 9. The carrier element 71 is screwed via attachment screws 71b

onto the structural horizontal carrier 9. In a modified embodiment, according to Figure 3, the attachment of the carrier element or the slide track profile is also provided directly on a housing wall. To mount the slide track profile 72, the carrier element 71 has a suspending fixture 71a. The mounting of the slide track profile 72 on the carrier profile takes place via suspending and bracing to the clamping arrangement 71a arranged on the mutually facing front sides of the profiles. The cover hood 7 is attached to the slide track profile 72 in the same way, so that the carrier profile 71, the slide track profile 72, and the cover hood form a composed cube-shaped body with aligned outer sides.

The slide track profile 72 has on its inner side the slide track 72a. The slide track 72a guides the reel cars 72 in that they are arranged to be axially displaceable on the slide track 72a. The reel cars have cam rollers 73a which coact with the slide track. The cam rollers 73a run on the fixed slide track 72a, which has two mutually facing sliding surfaces in a horizontal plane. The sliding surfaces are formed on the mutually facing sides of the slide track profile 72 and bent into a convex shape. They can, however, also be configured as concave or also slanted planar surfaces.

Several cam rollers are preferably arranged one behind the other in the sliding direction, which roll off on the mutually facing sliding surfaces, that is, that the first cam rollers slide on one sliding surface, and the other cam rollers slide on the other sliding surface.

The sliding wing 1 is adjustably supported on the reel car 73 by means of a suspending and adjusting device 74. The sliding wing 1 is arranged aligned under the reel car 73 and engages with its horizontal upper edge in dependence upon the adjustment of the suspending and adjusting device 74 more or less deeply into the slide track profile 72.

Connecting to the front side of the slide track profile 72 is arranged a holding space, which is covered by the cover plate 77 suspended in the slide track profile 72. In the holding space are arranged the drive unit 31 and the functional units 3; they are the components 32, 33, 34, 35, shown in Figure 2. They are attached via an attachment groove 6 with attachment screws to the front side of the profile 72. They are electrically connected to the bus arrangement 4 arranged on the front side of the profile 72. The electric connection on the bus arrangement is shown in detail in Figure 4. Furthermore, the components 3 have a clamping arrangement 5 on their side which faces the front side of the profile 72, with which they are attached in the area of the bus arrangement 4 via a clamping arrangement.

In a horizontal plane of the holding space is arranged a conventional belt drive arrangement 76, which has a catch 75 guided by deflection rollers which are not shown. The catch 75 engages under the sideways slide track profile leg into the sliding wing plane and is attached, on the one hand, to the suspending and adjusting device 74 and, on the other hand, to a circulating thrum [trum - term not listed in dictionaries, ed.] of the drive belt arrangement 76. In the holding space, on the side wall of the slide track profile 72, above the drive belt plane, that is, on the front, are arranged the bus arrangement 4 and the mechanical attachment fixture 6. In a modified embodiment, according to Figure 3, the bus arrangement 4 and/or the mechanical attachment fixture 6 can be arranged in another area inside the housing 7, for example, on a horizontal carrier profile, which is arranged in the holding space in the area of the upper horizontal leg of the cover hood 77, or forms the same.

In the holding space are arranged the electric functional units 3 as well as the drive units 31 on the bus arrangement 4 and/or on the mechanic attachment fixture 6. The mechanic attachment fixture 6 has two grooves 61

which run parallel to the bus arrangement 4, wherein in the grooves 61 are supported displaceable groove pads 62. The electric functional units 3 have, as shown in Figure 3, screws 63 which engage into the groove stones 62 for a releasable and adjustable attachment.

Figure 4 is an enlargement of the section of the clamping arrangement 5 and the electric bus arrangement 4 of Figure 3. The bus arrangement 4 has a mounting rail arranged on the slide track profile 72 with two parallel axially running L profiles 45 and conductors and/or ribbon cables arranged between the latter. The two vertical legs of the L profiles are arranged parallel to the slide track profile 72 and face in mutually opposite directions. The horizontal leg of the L profiles 45 delimits on both sides a holding groove 41 having a rectangular cross section, which is configured for accommodating electric bus bars and/or ribbon cables. The electric bus bars form the bus lines and are configured in the rectangular holding groove 41 as two electrically conducting tracks 43a, b with the same cross section form arranged parallel and at a distance from each other. The remaining space of the holding groove 41 is filled with an elastic rubber-like isolation material 42. In a modified embodiment, also a ribbon cable can be arranged in the holding groove 41, wherein its cable conductors are configured as bus lines.

The clamping arrangement 5 is arranged between the electric functional unit 3 and the bus arrangement 4. The clamping arrangement 5 has a plastic clamp 51 which is attached to the electric functional unit, which has two clamps 52a, b which grip onto the two vertical L legs 45 of the bus arrangement 4. The clamp 51 is configured as a releasable clip connection, while the clamp 51 is made of an elastic material, for example, a plastic. The clamping arrangement 5 also has two electrically conducting contacting domes 44a, b arranged across from the bus bars 43a, b, which are in electric connection with the

electric functional units. The contacting domes are configured so that they cut through the isolation material 42 when the clamping arrangement 5 is attached to the bus arrangement 4 and come into electrically conducting contact with the electric bus bars 43a, b and produce the electric connection of the functional unit 3 to the bus arrangement.

When removing the clamping arrangement 5 from the bus arrangement 4, the contacting domes 44a, b leave behind holes in the isolation material 42. To reestablish the isolation, the isolation material is configured so as to be elastic to provide an automatic closure of the holes.

As shown in Figure 4, the two bus bars 43a, b and the complementing contacting domes 44a, b of the clamp 51 are arranged asymmetrically to exclude an inversion of the polarity by a twisting of the clamp 51 by 180°. In another embodiment, the clamp 51 can also be configured asymmetrically, for example, it can have a groove on one side which coacts with an L profile, which prevents a twisting of the clamp. The two bus bars are configured as two-wire buses, for example, a CE bus or LON powerline. The power supply of the electric functional units and the data and signal transmission take place via the same lines 43a, b.

In a modified embodiment of Figure 4, it can be provided to configure the profile housing 7 as a part of the bus arrangement, for example, a mass line and/or screening, wherein a two-wire bus in the holding groove 41 has only one conductor. It is also possible to configure the bus arrangement 4 as a three-wire bus, for example, a CAN bus or ASI bus, or as a multiwire bus. Hereby, the transmission of the electric energy and the data and signal transmission take place via separate lines.

In a modified embodiment of Figure 4 it can be provided that the clamp 51 is not attached directly to the

electric functional unit 3, but is connected to the same via a cable.